CONCLUSION: Among the exercises tested, dominant arm D2 extension was the most robust predictor of fastball velocity. Athletes and coaching personnel may consider incorporation of this exercise into conditioning programs aimed at increasing fastball velocity.

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Pitching Kinematics But Not Countermovement Jump Kinetics Increase With Fall Practice Phases In Collegiate Baseball

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(No relevant relationships reported)

Assessment of sports performance is commonly relegated to off field evaluations due to the impractical nature of biomechanical analysis. With advances in markerless motion capture, previously immeasurable hypotheses can now be examined, such as whether variations in practice phase impact off-field testing or pitching mechanics.
PURPOSE: This study assessed lower extremity (LE) and center of mass (COM) pitching kinematics and countermovement jump (CMJ) kinetics during the Fall baseball season. We hypothesized that practice phase would affect LE and COM pitching kinematics and CMJ kinetics.
METHODS: 18 collegiate pitchers (RH/LH: 15/3; Mass: 92.01 ± 1.90 kg; Height: 1.90 ± 0.06 m; Pitch Speed: 39.62 ± 1.42 m/s), participated in the Fall season, divided into bullpen (BP), where only the pitcher and catcher occupied the field of play and simulated game (SG) phases with batters present. Kinematics were derived from tracked key points using an 8-camera markerless motion capture system (300 Hz), specialized for pitching analysis. In parallel, CMJ kinetics were collected during training sessions using a wireless dual force platform system (1000 Hz). Paired t-tests were used to compare practice phases to pitching kinematics, and CMJ kinetics.
RESULTS: Max stride phase COM velocity (to home plate) (MD±SE [CI95]: 8.73 ± 1.92 [4.58, 12.87] cm/s, $p < .001$, Cohen's d: 1.216), post stride foot contact COM velocity (away from home plate) (MD±SE [CI95]: 7.99 ± 2.60 [2.10, 13.88] cm/s, $p < .001$, Cohen's d: 0.970), stride length (MD±SE [CI95]: 0.98 ± 0.28 [0.39, 1.57] % height, $p = .004$, Cohen's d: 0.760), max pelvis rotation velocity (MD±SE [CI95]: 15.99 ± 15.75 [-34.15, 66.14] degrees/sec, $p = .046$, Cohen's d: 0.508), and pitch speed (MD±SE [CI95]: 0.91 ± 0.48 [2.09, 10.33] m/s, $p < .001$, Cohen's d: 1.910) were greater during SG compared to BP. Average vertical concentric force (MD±SE [CI95]: -25.96 ± 11.13 [-49.18, -2.73] N, $p = .045$, Cohen's d: -0.509) decreased during SG compared to BP, without differences in eccentric rate of force development ($p=.79$), or vertical concentric impulse ($p=.30$).
CONCLUSIONS: Progression in practice phases drives increases in pitching kinematics without differences in CMJ kinetics, highlighting the practice setting as a modifiable variable in player development and rehabilitation programs.

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The Relationship Between Unilateral Press Performance And Fastball Velocity In Major League Baseball Pitchers

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Fastball velocity (FV) is a primary determinant of success in Major League Baseball (MLB) pitching. Understanding which exercise motions predict higher velocity can aid in the optimization of training programs.
PURPOSE: To evaluate the relationships between FV and power and acceleration in unilateral pressing motions.
METHODS: We tested 28 professional MLB pitchers using a Proteus device (Proteus Motion, USA). Each pitcher performed 5 repetitions of unilateral horizontal press (12lb) with dominant and non-dominant arms and shot put (18lb) on the dominant arm with and without a countermovement loading phase. Peak power (W) and peak acceleration (m/s^2) achieved during each repetition were recorded. Average peak values across the 5 repetitions served as predictors in simple linear regression models. The dependent variable was official MLB reports of subsequent in-game FV.
RESULTS: Player age was 29.5 ± 4.1 yr, height was 192.0 ± 6.0 cm, weight was 96.7 ± 9.2 kg, and they had played 4.1 ± 3.1 seasons in the MLB. Shot put power was 401.9 ± 43.4 W and acceleration was 13.7 ± 2.9 m/s^2. Including countermovement loading, shot put power was 417.6 ± 53.4 W and acceleration was 14.5 ± 4.3 m/s^2. Horizontal press power was 209.7 ± 26.4 W for the dominant arm and 201.8 ± 19.6 W for non-dominant. Acceleration was 19.5 ± 7.0 m/s^2 for the dominant arm and 18.3 ± 5.0 m/s^2 for non-dominant. FV was 92.6 ± 2.6 mph and was related to age (β=-0.303; p=0.010) and number of seasons played (β=-0.456; p=0.002). Simple linear regressions found FV to be predicted by shot put acceleration (r^2=0.147; β=0.343; p=0.044; 95% CI: 0.010, 0.677), shot put countermovement power (r^2=0.182; β=0.021; p=0.023; 95% CI: 0.003, 0.038), shot put countermovement acceleration (r^2=0.229; β=0.288; p=0.010; 95% CI: 0.075, 0.501), dominant horizontal press acceleration (r^2=0.242; β=0.182; p=0.008; 95% CI: 0.052, 0.312), and non-dominant horizontal press acceleration (r^2=0.139; β=0.190; p=0.051; 95% CI: -0.001, 0.381). Non-significant predictors were shot put power (p=0.113) and horizontal press power in the dominant (p=0.134) and non-dominant (p=0.908) arms.
CONCLUSION: Acceleration predicted FV better than power in the exercises tested. Velocity may be improved by conditioning programs that emphasize acceleration in unilateral press motions.

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Lower Body Lean Mass Asymmetry Is Not Associated With Performance Asymmetries In Collegiate Baseball Players

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